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Maritimes Region

Proceedings of the Assessment of 4VWX Herring Maritimes Regional Science Advisory Process

April 7-8, 2011
Dartmouth, Nova Scotia

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Canada

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A Maritimes Region Science Regional Advisory Process (RAP) was conducted on April 7 - 8, 2011, at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia to review an assessment of 4VWX herring. Participation in this meeting included Fisheries and Oceans Canada (DFO), Province of Nova Scotia, Province of New Brunswick, the fishing industry, and aboriginal communities. The results of this meeting will form the basis for scientific advice for fishery management of these stocks.

Compte rendu de l'évaluation du processus de consultation scientifique régionale du hareng des divisions 4VWX de la région des Maritimes; 7 au 8 avril 2011

SOMMAIRE

Un processus de consultation scientifique régionale de la région des Maritimes a été mené les 7 et 8 avril 2011 à l'Institut océanographique de Bedford à Dartmouth (Nouvelle-Écosse) pour examiner une évaluation du hareng des divisions 4VWX. Les participants à cette réunion comprenaient Pêches et Océans Canada, la province de la Nouvelle-Écosse, la province du Nouveau-Brunswick, l'industrie de la pêche et des collectivités autochtones Les résultats de cette réunion serviront de base pour l'avis scientifique sur la gestion de la pêche de ces stocks.

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INTRODUCTION

BACKGROUND AND OBJECTIVES

Ross Claytor chaired the meeting and began with a short introduction on the procedures with respect to the meeting, the Terms of Reference (Appendix 1), the agenda (Appendix 2), and a round of introductions for those in attendance (Appendix 3).

The objectives of the meeting were:

A. Review and evaluate biological and fishery information on 4VWX herring stock status that supports establishing the final quota for 2010/2011 fisheries, as required in the Integrated Fisheries Management Plan, including:

- An evaluation of the southwest Nova Scotia / Bay of Fundy spawning component.
- A compilation and review of information regarding the offshore Scotian Shelf spawning component and the coastal Nova Scotia spawning component.
- Update on southwest New Brunswick migrant juvenile fishery component.

From the January 2011 Framework review, the following assessment elements for the southwest Nova Scotia / Bay of Fundy spawning component will be addressed for this meeting:

1. Report on criteria for survey and sampling and identify anomalies
2. Signs of change using the following indicators
    a. Survey biomass trends
    b. Fishermen input
    c. Numbers or proportion at age in catch
    d. Trends in exploitation rates from survey
    e. Mortality rate trends based on age composition, F=Z-M

B. Provide advice on the recovery and rebuilding of 4VWX herring if necessary. In so doing, provide advice on the consequences of different harvest levels during the 2010/2011 fishing year on:

1. Stock abundance and biomass.
2. Exploitation rate.

C. Evaluate attributes of relevance to conservation objectives and the precautionary approach, including, where available, description of bycatch, possible benthic impacts, predator/prey interactions, and descriptions of the role of herring in the ecosystem.

D. Evaluate if there has been an improvement in the stock status of the Bras d'Or Lake herring since the closure.

UPDATE AND SUMMARY OF DATA INPUT MEETING MARCH 29-30, 2011

The discussion focused on productivity (growth) and condition of herring. It was noted that the 2010 fat content was the lowest since 1994. Interpretation of this condition was not possible for the meeting because information on fat content has only been collected intermittently. The plants provided information from 1994 – 1997 and then again from 2001 to 2010. The environmental variables that are important to consider for interpreting trends in condition have not been formatted in a manner that would facilitate these analyses. Subsequent to the meeting, Ross Claytor and Gary Melvin have contacted the individuals in Ocean Sciences that manage these data. To make progress on these questions will require identifying dedicated staff to focus on this question.

ASSESSMENT

SOUTHWEST NOVA SCOTIA/BAY OF FUNDY SPAWNING COMPONENTS

Acoustic Surveys

There was an adjustment in the 2003 calibration data which lead to a revision in the historical biomass estimates. Reporting on number of spawners in the samples would help to interpret the distribution of spawning and to interpret changes in catchability associated with the spawning surveys. In particular, including a depth index for spawning schools would assist in interpretations of variation in annual catchability.

The distance between transects was discussed, as was the possibility that fish present between lines were not sampled and could bias final estimates. Sometimes the lines are three miles apart and the possibility of missing fish is increased. Criteria for consistency of the survey need to be developed and reported on annually.

The survey cycles, ideally, every 14 days unless additional fish are observed or weather conditions impact the survey date. It is assumed that spawning herring turn over every 14 days, so some surveys are excluded to avoid double counting. Surveys are conducted by multiple vessels (6-12) each doing two transects within a 6 hour period.

Note: The Herring Science Council (HSC) will review procedures, in particular the Scot's Bay timing and tides, and the interference from sonar and feedback during the fleet.

The criteria established in the framework for identifying a robust index of abundance should be evaluated annually.

It was noted that all samples related to the acoustic fishery come from the fishery catch either the day of or the day after the survey. The sampling is done in the plants. Three to four major plants sample randomly. There may be multiple sets in a sample. The majority of samples collected during the *Needler* Research Vessel (RV) survey within the spawning box were juvenile herring. Juvenile herring were noted to be concentrated at the bottom, with larger herring up in the water column. This situation should be reviewed to determine if it creates bias in the conclusions from these samples.

Small fish are not often observed in the fishery samples. In the past, where significant proportions of small fish were observed, their contribution to the estimate of spawning stock

biomass (SSB) backscatter was removed from the final estimate. Including depth as a diagnostic would allow this effect to be better understood.

The location of every set in the fishery is known and compared to the survey boxes to assess any bias that may originate from fish observed outside the survey area.

It was concluded that there was nothing in the data that indicates the survey protocols produce an under-estimate of biomass.

The conclusion on abundance trends was that there had been oscillation around the average. Overall the error bars include the long-term average with the exception of 2008 and 2010.

Exploitation Rate

Error bars are currently not reported. The lower and upper 95% confidence intervals for the acoustic surveys would guide statements about uncertainty regarding the impact of fishing.

Recruitment

A method for interpreting changes in size of fish caught in the survey and their relationship to changes in the population needs to be determined. Currently there is considerable uncertainty about year-class strength. If mean-weight in the fishery is declining, it could be because a strong year-class is coming or the fishery is targeting younger herring.

It was noted that the industry had taken measures to reduce the catch of small fish.

Conclusions

The 2005 year-class is a strong, but there is a decline in 6+ ages in spawning stock biomass.

Exploitation rate has been constant in response to changes in survey biomass over the two time periods.

German Bank is fluctuating about the mean from 2001 to 2010.

Scot's Bay has a downward trend from 2001-2005 and a slight upward trend from 2005-2010 but is still 25% of where it was in 2001.

Trinity Ledge varied from 10–16,000 t from 2001-2006 and since 2007 has been below 5,000 t.

Total SSB at the beginning of the acoustic time series the stock level was low relative to that in the 1980s.

In 2010, there appears to be a broad range of ages in the commercial catch (1-9) as well as in the acoustic survey catch (3 -11). There is a lack of herring older than age 5. The proportion of age 7 and older herring in the catch is the lowest since 1995.

In Scot's Bay, there is some shift in spawning time but the duration is the same length each year.

In German Bank the spawning period is being maintained, while Trinity Ledge shown little signs of improved spawning.

Relative fishing mortality (F) is fluctuating about the mean for the time period.

There has been a decline in herring mean-weight at age. This decline was greater than expected based on recent trends and coincident with:

1. The lowest condition factor on record in Southwest Nova Scotia (SWNS) since 1974. There was no trend in condition factor for Scot's Bay and the Scotian Shelf. SWNS is the source of majority of the catch.

2. Fat content is amongst the lowest in the last 2 decades and comparable to levels previously seen in 1994 and 1998.

3. There was a negative relationship between condition factor and annual temperature and a positive relationship with annual chlorophyll.

COASTAL (SOUTH SHORE, EASTERN SHORE AND CAPE BRETON) NOVA SCOTIA

The Total Allowable Catch (TAC) is directly tied to changes in survey abundance. The TAC is based on 10% of the survey abundance.

There was no fishing effort in Glace Bay last year and biomass acoustic observed few spawning fish.

OFFSHORE SCOTIAN SHELF BANKS

The average catch in offshore banks has been about 8,000 t with an allocation of 12,000 t.

Fishing occurs beyond the 25 mile line, and there remains concern about mixing of inshore and offshore stocks.

SOUTHWEST NEW BRUNSWICK MIGRANT JUVENILE

Weir catch was an all-time low at less than 10,000 t.

There was reduced effort compared to previous years.

The catch is almost entirely two year olds.

The meeting concluded with a review of the SAR.

RESEARCH AND REPORTING RECOMMENDATIONS

1. Undertake analyses to understand the relationship between temperature, chlorophyll, and herring growth and condition.

2. An analysis of environmental trends and fishing success would help to adjust expectations for fishing and influence location of trips.

3. Investigate biases associated with the distance between transect lines in the survey.

4. The criteria established for a robust index of abundance should be reported annually with the survey results.

5. Error bars should be reported for exploitation rate.

6. A method of determining year-class strength needs to be developed.

APPENDIX 1. TERMS OF REFERENCE.

Assessment of 4VWX Herring
Maritimes Regional Science Advisory Process

7-8 April 2011

Dartmouth, NS

Chairperson: Ross Claytor

TERMS OF REFERENCE

Context

Maritimes DFO Fisheries Management (FM) requests DFO Science to undertake an annual assessment of the 4VWX herring management unit in support of the upcoming fishery. A new framework for conducting the annual assessment was initiated in 2006 and completed in 2011 and work has been conducted to improve many aspects of the assessment.

The 24-28 January 2011 Framework review recommended the following assessment elements for the southwest Nova Scotia / Bay of Fundy spawning component:

1. Report on criteria for survey and sampling and identify anomalies
2. Rank with respect to criteria for an abundance index that consistently covers the stock. Use past data to determine a method and usefulness of this approach.
3. Signs of change using the following indicators
    a. Survey biomass trends
    b. Fishermen input
    c. Numbers or proportion at age in catch
    d. Trends in exploitation rates from survey
    e. Mortality rate trends based on age composition, F=Z-M

The objectives of the April 2011 meeting are described below. They are tailored to the priorities given the time available between the completion of the Framework and the requirement for 2011 advice.

Objectives

A. Review and evaluate biological and fishery information on 4VWX herring stock status that supports establishing the final quota for 2010/2011 fisheries, as required in the Integrated Fisheries Management Plan, including:

- An evaluation of the southwest Nova Scotia / Bay of Fundy spawning component.
- A compilation and review of information regarding the offshore Scotian Shelf spawning component and the coastal Nova Scotia spawning component.
- Update on southwest New Brunswick migrant juvenile fishery component.

From the January 2011 Framework review, the following assessment elements for the southwest Nova Scotia / Bay of Fundy spawning component will be addressed for this meeting:

3. Report on criteria for survey and sampling and identify anomalies
4. Signs of change using the following indicators
    a. Survey biomass trends
    b. Fishermen input
    c. Numbers or proportion at age in catch
    d. Trends in exploitation rates from survey
    e. Mortality rate trends based on age composition, F=Z-M

B. Provide advice on the recovery and rebuilding of 4VWX herring if necessary. In so doing, provide advice on the consequences of different harvest levels during the 2010/2011 fishing year on:

3. Stock abundance and biomass.
4. Exploitation rate.

C. Evaluate attributes of relevance to conservation objectives and the precautionary approach, including, where available, description of bycatch, possible benthic impacts, predator/prey interactions, and descriptions of the role of herring in the ecosystem.

D. Evaluate if there has been an improvement in the stock status of the Bras d'Or Lake herring since the closure.

Expected Publications

CSAS Science Advisory Report
CSAS Proceedings
CSAS Research Documents

Participation

DFO Science
DFO Resource Management
Provincial government (fisheries)
Herring fishing industry
Aboriginal communities
Academics
Jason Stockwell
David Libby

APPENDIX 2. AGENDA.

Maritimes Region Science Advisory Process

Assessment of 4VWX Herring

NAFO Headquarters, 2 Morris Drive, Dartmouth, Nova Scotia

7-8 April 2011

DRAFT AGENDA

7 April 2011 – Thursday

13:00 – 13:15	Welcome, Introduction, and Review of Agenda
13:15 – 13:45	Update and summary of Data Inputs meeting of Mar. 29-30, 2011
13:45 – 15:00	Nova Scotia / Bay of Fundy spawning component
15:00 – 15:15	Break
15:15 – 17:00	Nova Scotia / Bay of Fundy spawning component (continued)
17:00 – 18:00	Update on DFO/Industry Collaborative Research

8 April 2011 – Friday

08:30 – 08:45	Review of previous day
08:45 – 10:15	Review of Offshore Scotian Shelf spawning component, and coastal Nova Scotia and New Brunswick coastal components
10:15 – 10:30	Break
10:15 – 12:00	Review of 4VWX Science Advisory Report
12:00 – 13:00	Lunch
13:00 – 14:30	Review of 4VWX Science Advisory Report
14:40 – 14:45	Break
14:45 – end	Review of 4VWX Science Advisory Report

APPENDIX 3. LIST OF PARTICIPANTS.

Assessment of 4VWX Herring
Maritimes Regional Science Advisory Process

7-8 April 2011

Dartmouth, NS

Chairperson: Ross Claytor

LIST OF PARTICIPANTS

Participant	Affilication
Allard, Jacques	Universite De Moncton
Baker Stevens, Nellie	Eastern Shore Fisherman's Protective Assn. (ESFPA)
Boudreau, Ginny	Guysborough Co. Inshore Fishermen's Assn (GCIFA)
Boutilier, Randy	LFA 32
Brzeski, Veronika	Project manager for the LFA 27 management board
Chen, Yong	University of Maine / Marine Sciences
Claytor, Ross (Chair)	DFO Maritimes / PED
den Heyer, Nell	DFO Maritimes / Dalhousie University (Reviewer)
Denny, Leon	Eskasoni Crane Cove Seafoods
Denton, Cheryl	DFO Maritimes / PED
Ferguson, David	President, LFA 27 Management Board
Gaudette, Julien	PES, Science Branch, SABA
Greening, Linde	NS Fisheries and Aquaculture
Kehoe, Paul	CFA 24 (S-ENS), CORE
Lavallée, Jean	Atlantic Veterinary College
Leslie, Stefan	DFO Maritimes / FAM
MacDonald, Carl	DFO Maritimes / FAM
MacDonald, Gordon	CFA 23 (S-ENS), Traditional Fleet
McIntyre, Tara	DFO Maritimes / PED
O'Leary, Eugene	Guysborough County Inshore Fishermens Association (GCIFA)
Pearo, Tricia	Fishermen and Scientists Research Society (FSRS)
Pezzack, Doug	DFO Maritimes / PED
Reeves, Alan	DFO Maritimes / PED
Silva, Angelica	DFO Maritimes / PED
Smith, Stephen	DFO Maritimes / PED
Sweeney, Anne	DFO Maritimes / FAM (SWNS)
Tremblay, John	DFO Maritimes / PED